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You may recall the ancient days of Rome when the people annually gathered to pay an offering of oil and wine, of milk and violets to the spirits of their ancestors, from the study of whose examples they gained for themselves and inculcated in others a respect for the virtuous past. So we say our *aves* to the great past out of which we and all our guiding principles in individual life, in the community, in the state, have come.

Our broader vision which must be the bloom of our intense specialization is like the dream of the patriarch who, resting his head on a pillow of stone, saw a ladder reaching from this earth to heaven and beheld the angels of God ascending and descending on it.

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THE COMMITTEE OF ONE HUNDRED ON SCIENTIFIC RESEARCH OF THE AMERICAN ASSOCIATION FOR THE ADVANCEMENT OF SCIENCE

REPORT OF THE SUBCOMMITTEE ON ASTRONOMY

THE science of astronomy differs in a marked manner from many other departments of human knowledge. Owing to the large sums of money which have been given to it, extensive organizations have been effected, thus enabling astronomers to undertake the great routine investigations which at present are regarded as the most important objects of astronomical research. No one will doubt that in this, as in every other science, the advance depends largely on individual genius and initiative. The invention of new methods has, however, now been so far accomplished that many astronomers are able to devote their time to applying these methods to large numbers of individual stars. Investigations which require years of continuous effort, and an expenditure of many thousands of dollars may thus be undertaken and successfully completed. The application of the methods of

scientific management has effected the same saving as in industrial processes. An excellent example of this is the determination of the accurate positions of one hundred thousand northern stars. This work, begun half a century ago, was divided among a dozen observatories, and was probably the most important astronomical research undertaken up to that time. One zone occupied an observer and corps of assistants for twenty years. The salaries alone exceeded one hundred thousand dollars. By the aid of photography this work is now being repeated with double the accuracy, and at less than a tenth of the cost. In another investigation, a saving of one minute in the reduction of an observation will reduce the time of its preparation by two years of the work of one assistant.

The greatest need of astronomy appears to be a large fund whose income could be used in the following ways:

1. Reestablishing the friendly international relations of astronomers of three years ago by assisting large astronomical projects directly or indirectly. Such projects can often be carried out far better and more economically by dividing the work between two or more observatories. The Cape Photographic Durchmusterung is a striking example of the excellent results of such cooperation.

2. Furnishing assistants to astronomers who would thus be relieved of laborious routine observations and computations. An excellent illustration of this was the article in *SCIENCE*, Vol. 41, 82, giving the replies of twelve leading astronomers regarding their greatest need. In almost every case it was one or more assistants.

3. Aiding observatories south of the equator in such a way as to render our knowledge of the southern stars more nearly equal to that of the northern stars. At present, many times as many observations are made of northern, as of southern, stars.

4. Providing means whereby preliminary investigations, sufficient to decide upon the best and most efficient methods of carrying on large projects, can in all cases be undertaken before these projects themselves are entered upon.

5. Establishing bureaus, generally at existing institutions, at which certain lines of investigation could be carried on for any astronomers needing them. For example, a computing bureau which would prepare the tables needed for any special or general purpose, as a bureau for computing orbits of newly discovered asteroids, or comets, a bureau for measuring photographs, thus determining precise positions, radial velocities from spectra, etc. Such work can be carried on far more efficiently by an astronomer in his own surroundings than if he is transported to a new establishment.

6. Making arrangements by which astronomers, overburdened by teaching, would be enabled to devote a specified portion of their time to research.

7. Assisting students taking postgraduate courses in astronomy, so that they could continue such work.

8. Supplying small telescopes, or other appliances, to those qualified to use them.

9. In general, aiding the advance of astronomy in any way that might prove efficient.

E. C. PICKERING,
Chairman

ERNEST W. BROWN,
WILLIAM W. CAMPBELL,
EDWIN B. FROST,
HENRY N. RUSSELL,
FRANK SCHLESINGER

REPORT OF THE SUBCOMMITTEE ON CHEMISTRY

THE following recommendations concerning the organization of efforts to advance the cause of research in chemistry are made on behalf of the committee in an informal way. The members of the committee exchanged opinions by correspondence, but no formal report was discussed by them.

1. To avoid duplication of work, to secure unity and strength of effort and to save the time of research chemists overwhelmed with committee work on this subject, the fusion of the research committee of the Committee of One Hundred and of the National Research Council, as recommended by the Committee on Fusion, is strongly endorsed.

2. A survey is recommended of all the investigators in chemistry, including those connected with universities, colleges, the government, state or municipal services, endowed research institutions and research laboratories of industrial establishments—with special emphasis on the field of work for which each man might be available.

3. The organization of efficient but simple means is recommended for bringing to the attention of research men in universities and colleges, who indicate an interest in technical research, those problems of manufacturers in the various states and centers of the country, which could be handled in the laboratories in question.

4. The consideration of the issue of a warning to universities and colleges is recommended in regard to:

(a) The imminent danger of allowing the university laboratories in which research men for the whole country are trained, to be too much weakened by the loss of staff of pronounced research ability to the technical research laboratories.

(b) The importance of protecting research teachers against the encroachments of administrative duties of every kind.

(c) The importance of giving younger members of the staff of proved research ability every opportunity in the way of time, facilities and assistants for the development of their full powers.

(d) The necessity of definitely protecting research in pure science where provisions are being made for closer connections with technical problems.

5. The furthering of plans for cooperative research between departments and between institutions is recommended for consideration.

J. STIEGLITZ,
Chairman

REPORT OF THE SUBCOMMITTEE ON RESEARCH FUNDS

DURING the year which has elapsed since the last annual meeting of the American Association, the report then made has been revised and somewhat extended. In this revised form it has been printed in *SCIENCE*.